**PROCESS SPECIFICATION**

CODE IDENT NO. 23835
SPEC NO. FS514161 REV. B

# GREASE APPLICATION
# (BRAYCOTE 600)
# DETAIL SPECIFICATION FOR

JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA, CALIFORNIA

## CHANGE INCORPORATION LOG

| CHANGE LETTER | RELEASE | | AUTHORITY | PAGES AFFECTED | DATE | ENG APPROVAL | |
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## 1. SCOPE

This specification covers the detail requirements and procedures for lubricating assembled ball and roller bearings.

## 2. APPLICABILITY

This specification is intended for Design, Build, Assemble and Test (DBAT) process under the Develop New Products (DNP) domain.

## 3. REFERENCE DOCUMENTS

### 3.1 SOURCE

This process specification is prepared under the JPL DBAT process policy, Section 2.1.15, Engineering Standards. It states that the selection of standards for use and the maintenance of change control over these standards shall be in accordance with the Provide Engineering Standards in the Provide Enabling Services (PES) domain.

### 3.2 APPLICABLE DOCUMENTS

The following documents, of the issue specified in the contractual instrument, form a part of this document to the extent specified herein. For JPL internal use, the issue shall be as specified by the JPL cognizant engineer.

SPECIFICATIONS

Jet Propulsion Laboratory

| BS513525 | Grease, Rocket Propellant Compatible, Braycote 600, "Micronic" Ultra-clean Version, Detail Specification for |
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Military

| MIL-std-1246C | Product Cleanliness Levels and Contamination Control Program |
|---|---|
| MIL-B-81705 | Barrier, Materials, Flexible, Electro-static-free, Heat Sealable |

Industrial

| ASTM D4066 | Nylon Injection and Extrusion Materials, 6 Nylon per General Purpose, Table PA |
|---|---|
| ASTM D4701 | Specification for Technical Grade Methylene Chloride |

PUBLICATION

Jet Propulsion Laboratory

<span style="color:blue">QAP 53.5</span>       <span style="color:blue">Magnetic Measurement and Demagnetization of Fasteners And Small Piece Parts</span>

4. REQUIREMENTS

4.1 Conflicting requirements. In case of conflict between the requirements of this specification and the requirements of any document referenced herein, the conflict shall be referred to the procuring activity or contracting officer for resolution.

4.2 Facilities. Parts coated in accordance with the requirements of this specification shall be processed in a suitably equipped facility. The facility shall contain the following items and features:

   a. Laminar flow bench.
   b. Clean stainless steel or glass containers.
   c. Ultrasonic cleaner (150 watts at 21 kHz).
   d. Clean drying oven.
   e. Clean plastic bags per MIL -B-81705 or equivalent of suitable size for packaging processed components and labeling provisions. The components may be transported  in clean tote boxes to a clean area outside of the clean room and repackaged into Nylon 6 bag material per ASTM D4066.
   f. Experienced personnel.

4.3 Approved product and manufacturer. The following product and manufacturer is approved by JPL: Braycote 600, "Micronic" ultra-clean version, manufactured by Bray Oil Co., Inc., 2698 White Road, Irvine, California 92714 or Nye, Inc., PO Box 8927, New Bedford, MA 02742.

4.4 Process
4.4.1 Demagnetization. The bearings shall be demagnetized per QAP53.5 a maximum of 24 hours prior to cleaning.

4.4.2 Cleaning and drying . Cleaning and drying shall be performed in accordance with the following procedure:

   a. Following demagnetization, remove shields and seals carefully. Unless otherwise specified, disassembly of the bearings is not required.

b. Clean components ultrasonically at room temperature in methylene chloride for a minimum of two and a maximum of five minutes at 150 watts and 21 kHz (Bendix SEC-48 or equivalent).

**- CAUTION -**
Excessive vibration may damage some components such as
non-metallic retainers. These should be soaked in the solvent for 1/2 to 3/4 hour in lieu of
ultrasonic cleaning.

c. Remove components from ultrasonic cleaner prior to de–energizing the apparatus.
d. Spray each component immediately with Castrol Fluoroclean ™ X100 or Nye Fluorosolvent 504. Do not permit free rotation of the bearings but rotate them manually in order to expose all raceways and free the bearings of any residual contaminants. Exercise care in preventing free rotation of bearings. Rotate the bearings by hand to expose all raceway areas.
e. Dry metallic components in a clean oven at 150 ±10°F for 10 to 20 minutes. Dry components, which contain porous non–metallic retainers, at 150 ±10°F for 45 to 75 minutes.
f. Remove components from the drying oven and place them immediately on a laminar flow bench. Proceed with application of lubricant as soon as components cool to ambient temperature (approximately 30 minutes to one hour).

4.4.3 Application of grease. The application of grease shall be performed in accordance with the following procedures.

4.4.3.1 Preparation. The lubricant solution shall be prepared as follows:

a. Determine amount of solution required for the specific lubrication task.
b. Clean containers and stirrer with methylene chloride.
c. Prepare a solution containing 10 ±1% Braycote 600 and 90 ±1% Castrol Fluoroclean ™ X100 or Nye Fluorosolvent 504 by weight.
d. Keep the solution tightly covered in order to minimize evaporation (discard if there is evidence of contamination).

4.4.3.2 Application. The lubricant shall be applied to the surfaces of components in accordance with the following procedure:

a. Agitate the mixture by manually shaking for two or more minutes in order to ensure that the solution is homogeneous.
b. In order that complete coverage of the raceways will be accomplished, the preference is to submerge components in lubricant mixture and rotate bearings by hand, or optionally, to copiously apply the lubricant mixture with a syringe.

c. Place components on a laminar flow bench for 15 ±5 minutes.
d. Place components into a clean oven and dry at 150 ±10°F for 60 ±5 minutes.
e. Place components on a laminar flow bench and cool to ambient temperature.

4.4.3.3 Additional grease. Additional grease may be applied on specific components, if it is considered beneficial and necessary, by repeating 4.4.3.2 using the syringe method.

4.4.3.4 Shields and Seals.  Reinstall (or replace) shields and seals carefully.

4.4.3.5  Non-Volatile Residue Test (NVR).  The non-volatile residue test may be performed when requested in order to ensure contamination of one microgram per cubic centimeter or less (MIL-STD-1246C, Level A).

## 5. QUALITY ASSURANCE PROVISIONS

5.1 Quality Assurance. Quality Assurance shall be provided by the Quality Assurance Flight Systems Section.

5.2 Materials and equipment. Quality Assurance shall ensure that the materials and equipment employed in applying the lubricant shall conform to the requirements of this specification.   This can include verification of non-volatile residue (NVR) on designated surfaces or materials when requested.

5.3 Visual inspection. Visual inspection at 15X magnification shall be performed on the components before processing, after cleaning, and after lubrication, in order to detect presence of contamination and occurrence of cracks or scratches on critical surfaces.

## 6. PREPARATION FOR DELIVERY

6.1 Packaging. Immediately after cooling, and possible addition of additional lubrication per 4.4.3.3, the components shall be packaged in clean bag material per MIL-B-81705 or equivalent in the clean room.   The components may be transported  in clean tote boxes to a clean area outside of the clean room and repackaged into Nylon 6 bag material per ASTM D4066.  In addition:

a. Components shall be individually packaged except that bearings shall be packaged as sets.
b. The individual bags shall be clearly marked with the component part number and serial number, if applicable.
c. Each bag shall contain the following clearly visible note:

- CAUTION -
Open only in a clean environment. Reseal before storage and/or transportation.